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U.S. Department of the Interior
Bureau of Land Management
Wyoming State Office

Worland Field Office February 1999

Management for the Red Gulch Dinosaur Tracksite Big Horn County, Wyoming

Environmental Assessment WY010-EA9-21

99-016921

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MISSION STATEMENT

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/WY/PL-98/012+1020

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Wyoming State Office
P.O. Box 1828
Cheyenne, Wyoming 82003-1828

In Reply Refer To:

3032 (010)

Dear Reader:

Attached for your review and comment is the Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for a planning review of the Red Gulch Dinosaur Tracksite located in Big Horn County, Wyoming. This EA describes three alternatives for managing the review area, including the Bureau of Land Management's Preferred Alternative. The environmental consequences of implementing each of the alternatives are also presented in the document. The planning review area is comprised of about 1,800 acres of BLM-administered public land in the Worland Field Office's Washakie Planning Area.

A review of existing land-use planning decisions is being conducted to evaluate how to best manage public lands, resources, educational opportunities, and other values associated with the recent discovery of dinosaur tracks on BLM-administered public lands near Shell, Wyoming. The tracks were not addressed in the Washakie Resource Management Plan (RMP) which was completed in 1988. A review of BLM's planning decisions for the discovery area is needed to evaluate the adequacy of existing management prescriptions for the protection of the tracks and related values.

The BLM's Preferred Alternative would emphasize management of the Red Gulch Dinosaur Tracksite for scientific research, public education, and recreation. The tracksite would be designated an Area of Critical Environmental Concern (ACEC) and would become part of an existing Special Recreation Management Area (SRMA). In addition, the BLM would close the area to the staking and development of mining claims and would prohibit most other surface-disturbing activities under the Preferred Alternative. The Washakie RMP would be amended by these actions.

Reviewers will have 30 days after the Notice of Availability (NOA) of this EA is published in the Federal Register to submit protests on the proposed decision (Preferred Alternative) as provided by 43 CFR 1610.5-2. All parts of the proposed decision may be protested. Protests should be sent to the Director of the Bureau of Land Management, Attn: Ms. Brenda Williams, Protests Coordinator, WO (210), Rm. 1075, LS, Department of the Interior, Washington, DC 20240.

The same 30-day time period will be allowed for commenting on the proposed decision, other elements of the EA, and the FONSI; and 60 days, beginning on the same date, will be allowed for review and comment on the proposed ACEC designation (see 43 CFR 1610.7-2(b)). These comments should be directed to Bob Ross, Worland Field Office Planning Coordinator, P.O. Box 119, Worland, Wyoming 82401-0119.

Comments will be fully considered and evaluated in making any necessary changes to the EA and in the development of a decision record. Any protests will also be resolved before BLM issues the decision record.

Comments, including names and street addresses of respondents will be available for public review at the Worland Field Office, 101 South 23rd Street, Worland, Wyoming, during regular business hours (7:30 a.m. to 4:30 p.m.) Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish to withhold your name or address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your comments. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

Sincerely,

Alan R. Pierson
State Director

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U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Environmental Assessment
WY-010-EA9-21

Management for the Red Gulch Dinosaur Tracksite Big Horn County, Wyoming in the Bureau of Land Management's Washakie Planning Area of the Worland Field Office

Prepared by the
U.S. Department of the Interior
Bureau of Land Management
Worland Field Office
Worland, Wyoming

February 1999

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ABBREVIATIONS

ACEC	area of critical environmental concern
BLM	Bureau of Land Management, U.S. Department of the Interior
EA	environmental assessment
EIS	environmental impact statement
FONSI	finding of no significant impact
NARSC	National Applied Resource Sciences Center, Bureau of Land Management, U.S. Department of the Interior
NEPA	National Environmental Policy Act of 1969, as amended
NSO	no surface occupancy
RMP	resource management plan
SRMA	special recreation management area
SRP	special recreation use permit

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RED GULCH Dinosaur TRACKSITE

Management for the Red Gulch Dinosaur Tracksite Environmental Assessment

WY-010-EA9-21

INTRODUCTION

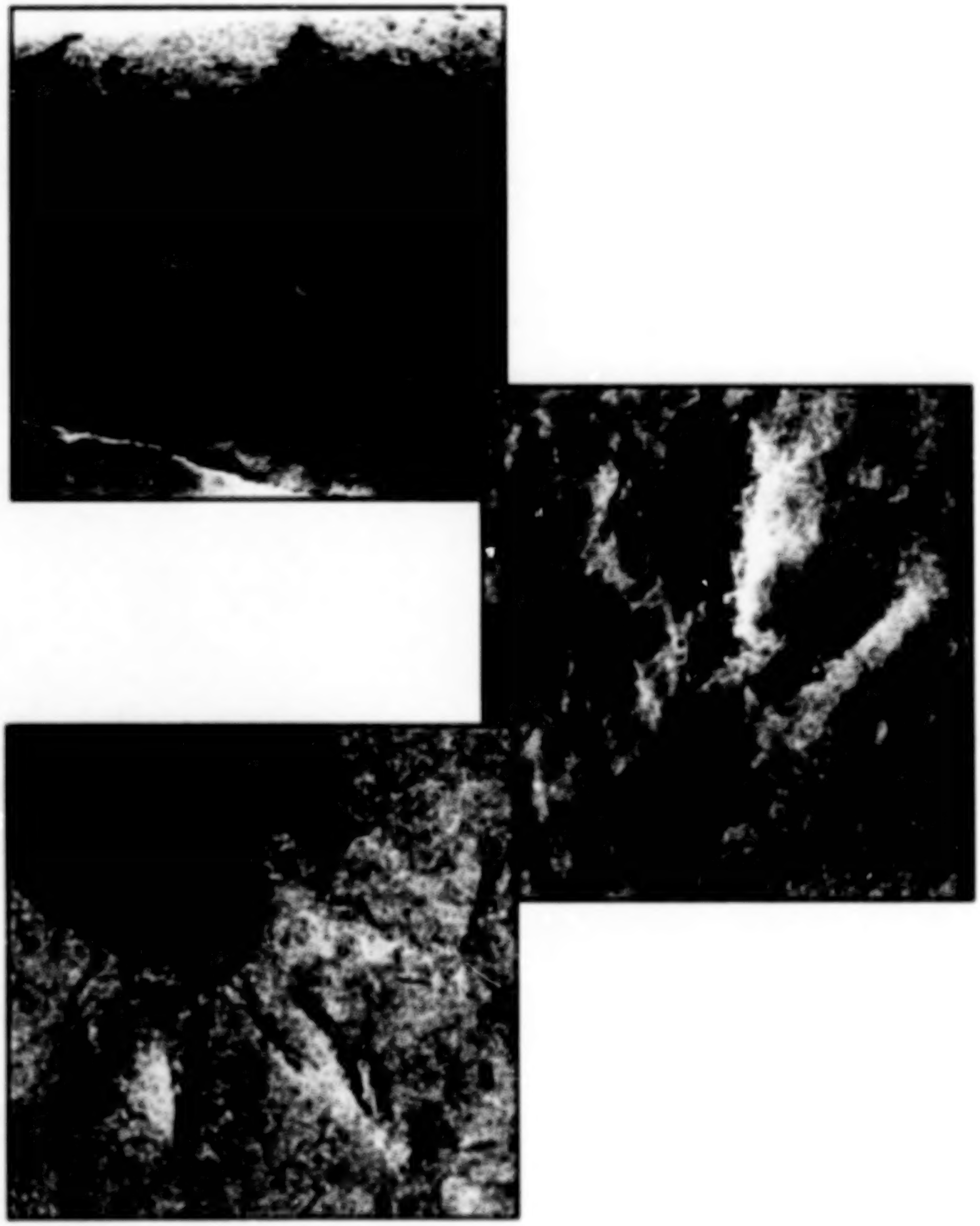
During the summer of 1997, dinosaur tracks were discovered near Shell, Wyoming on public lands administered by the Worland Field Office of the Bureau of Land Management (BLM). The discovery by Erik Kvale, a research geologist from Indiana University, has created significant interest among paleontologists, the local public, and the news media.

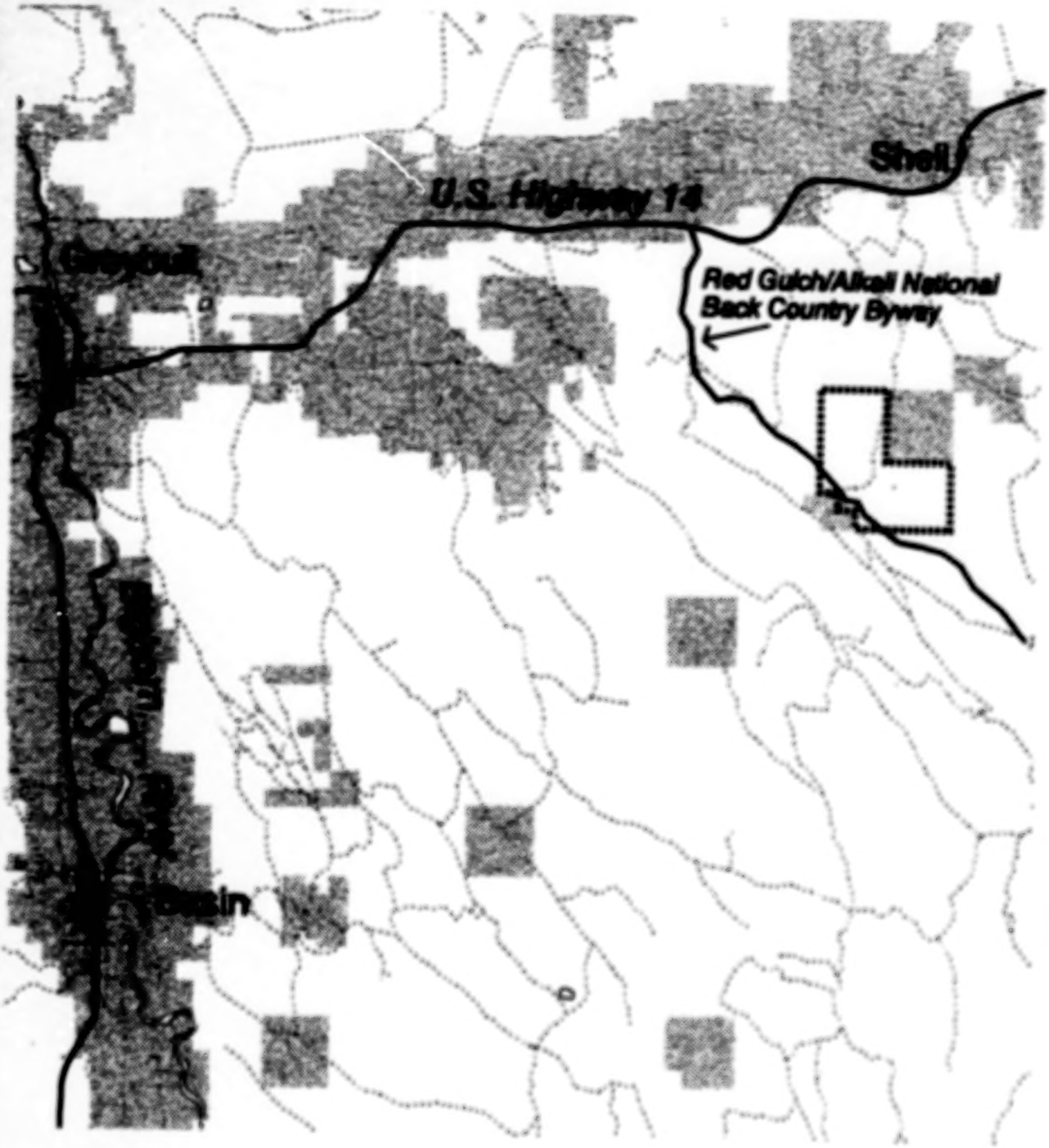
This discovery is particularly important because it could alter current views about the Sundance Formation and the paleoenvironment of the Middle Jurassic Period which existed 165 million years ago. No dinosaur remains have been found in the Sundance Formation and there are only a few known tracks. In this part of Wyoming, the Sundance Formation was known mainly for its fossil shells, left from an ancient sea. However, these dinosaur tracks were made along a shoreline, not in deep ocean water. This has caused researchers to conclude there must have been large areas of dry land to support these dinosaurs, as well as other animals and plant life. Some scientists believe that the majority of the footprints were made by theropods—meat-eating dinosaurs that walked on their hind legs.

Concerns over the protection and management of these dinosaur tracks, and desires by the scientific community to study them, prompted the BLM to begin the planning review documented in this environmental assessment (EA).

The discovery area, consisting of a few acres in section 20, T. 52 N., R. 91 W., and surrounding public land surface in the Sundance Formation where dinosaur tracks are known or anticipated to exist, will be the focus of this planning review. These lands, totalling about 1,800 acres, are described as the "planning review area" or "Red Gulch Dinosaur Tracksite" in this EA.

The name of the tracksite is derived from the nearby Red Gulch drainage, and because the BLM's scenic, 32-mile-long Red Gulch/Alkali National Back Country Byway crosses the area. (See Maps 1 and 2.)





Map 1 - General Location

(Dashed line shows approximate tracksite boundary. BLM-administered public land surface is white. Private and state lands are shaded.)

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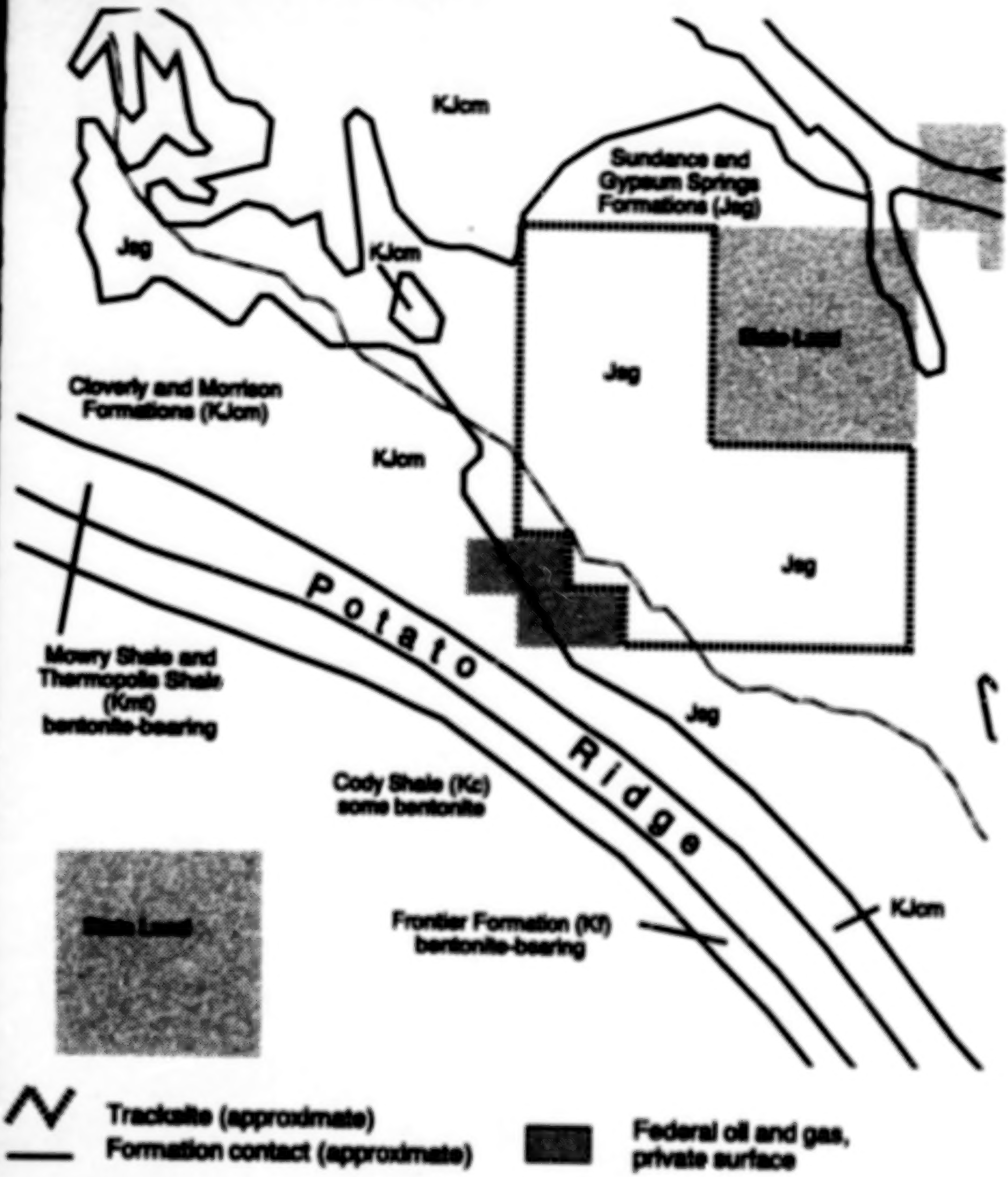
KJcm
Sundance and Gypsum Springs Formations (Jsg)
Jsg
KJcm
State Land
Jsg
Cloverly and Morrison Formations (KJcm)
KJcm
Potato Ridge
Jsg
Mowry Shale and Thermopolis Shale (Kmt) bentonite-bearing
Jsg
Cody Shale (Kc) some bentonite
State Land
Frontier Formation (Kf) bentonite-bearing
KJcm
Tracksite (approximate)
Formation contact (approximate)
Federal oil and gas, private surface

Map 2 - Red Gulch Dinosaur Tracksite

(Precise identification of the tracksite will require further mapping. In this EA, the area is defined as "BLM-administered public land surface in the Sundance Formation where dinosaur tracks are known or anticipated to exist.")

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In addition to the BLM-administered public land surface, 160 acres of privately-owned surface with federally-owned oil and gas are immediately adjacent to the tracksite. Because of the federal interest in the mineral estate, the planning review will include these 160 acres when evaluating the potential for oil and gas occurrence and determining what conditions should be placed on any development.

Temporary management has been initiated to protect the health and safety of tracksite visitors, to allow for scientific research during the summer field season, and to prevent damage to the fossil resources. (See "Recreation" in the Affected Environment section of this EA.) On the basis of preliminary analysis, BLM has established a temporary closure to the staking of mining claims to protect the tracks. As part of the planning review, the BLM is collecting information to determine whether a long-term closure (mineral withdrawal) should be pursued and, if so, which lands should be involved.

PURPOSE AND NEED

This EA is being prepared to evaluate decisions in the Washakie Resource Management Plan (RMP, see Glossary) which pertain to the planning review area. In particular, a review is needed to evaluate the adequacy of the RMP's existing management to protect paleontological resources and provide opportunities for scientific research. This planning review will determine such things as (1) how to provide for scientific research at the tracksite and how to use the information gathered from that research for public education, (2) whether the tracksite should be designated an area of critical environmental concern (ACEC, see Glossary), (3) whether the tracksite should be identified for enhanced recreation management within a special recreation management area (SRMA, see Glossary), (4) whether the tracksite should be closed to mineral location and whether a withdrawal for that purpose will be pursued, (5) whether these determinations or other management actions being considered are in conformance with the Washakie RMP, and (6) whether or not an amendment to the RMP will be necessary.

This EA documents and analyzes in detail, three alternatives. The broad themes for these alternatives and some of their most important elements are summarized below. (Table 1, which appears later in this document, describes and compares the alternatives in detail.)

> **ALTERNATIVE 1 - NO ACTION:** Existing management consistent with the Washakie RMP would be continued. Visits to the tracksite by individuals and organized groups would be allowed. The BLM would make these visits as safe as reasonably possible by providing on-site services such as vehicle barriers and signs for direction, safety, and resource protection. However, no special management actions would be undertaken to protect the dinosaur tracks or to emphasize their importance for scientific research, public education, or recreation.
>
> The area would be patrolled to guard against vandalism and unauthorized removal of public resources.
>
> All scientific and educational researchers studying the dinosaur tracks or working in that geologic horizon would be required to obtain a paleontological resources use permit.

ALTERNATIVE 2 - MANAGEMENT FOR SCIENTIFIC RESEARCH: Those elements summarized for Alternative 1 would also be included in Alternative 2. In addition, management of the area for scientific research would be emphasized. The BLM and(or) volunteer groups would conduct tours of the area for school groups and would assist as guides while the scientists are working. A few interpretive signs would be developed but the BLM would not emphasize opportunities for public education or recreation.

An area of critical environmental concern would be designated to encompass public land surface in the Sundance Formation where dinosaur tracks are known or anticipated to exist. A locatable mineral withdrawal would be pursued to close this area to the staking and development of mining claims.

ALTERNATIVE 3 - MANAGEMENT FOR SCIENTIFIC RESEARCH, PUBLIC EDUCATION, AND RECREATION: Those elements summarized for Alternative 1 would also be included in Alternative 3. In addition, a parking area, other facilities, and interpretive signs would be developed as part of a recreation project plan. Visitors could view the dinosaur tracks independently and watch scientific studies in progress. The BLM and volunteer groups would offer interpretive tours of the area. The area would be managed to emphasize opportunities for scientific research, public education, and recreation.

Some interpretive facilities would be established away from the tracksite, near the junction of the Red Gulch/Alkali National Back Country Byway and U.S. Highway 14. These facilities would highlight the tracksite as well as other nearby paleontological resources, such as dinosaur discoveries on public land near the Howe Quarry.

An ACEC designation and closure to the staking and development of mining claims would be the same as described under Alternative 2. The tracksite would be included within the West Slope of the Bighorn Mountains SRMA.

The BLM's preferred alternative is Alternative 3.

PLANNING PROCESS

The National Environmental Policy Act (NEPA) environmental analysis process is being used in conducting the planning review. The NEPA process requires preparation of an environmental assessment (EA), or an environmental impact statement (EIS) if the EA results in a finding of significant impacts.

Steps in the planning review process, including the development of this EA, are listed below.

1. Paleontologists and geologists are consulted on the significance and vulnerability of the dinosaur tracks.

2. Temporary measures are put into effect to protect the health and safety of tracksite visitors, allow for scientific research during the summer field season, and prevent damage to the fossil resources. These measures include a temporary segregation of public lands to mineral location under the mining laws, the establishment of a "protocol" for the sharing

of research information among the scientists and the BLM, and the placement of signs requesting careful treatment of the tracks, warning the public of potential safety hazards, providing information about the tracks, and inviting comments for the planning review.

3. A notice of intent to conduct the planning review is published to inform the public of known and anticipated issues and of opportunities fur public participation and comment.

4. An interdisciplinary planning team describes and analyzes the existing management in the planning review area, identifies preliminary issues and management options, and describes the affected environment.

5. Public contacts and meetings are held for scoping and for review of the preliminary issues and alternatives.

6. With the help of the public, management options and alternatives for the area are formulated.

7. The analysis of the alternatives is documented in an EA.

8. Since the EA is anticipated to identify proposed decisions to be added to or changed in the current RMP (including pursuit of a mineral withdrawal), a notice is published to inform the public of the availability of the EA for review. This begins a 30-day comment/protest period and 60-day governor's consistency review. If the EA involves a possible ACEC designation, the notice also begins a 60-day period for public comment on the proposed ACEC designation.

9. If any protests are received on proposed decisions to be added to or changed in the RMP, these must be resolved by the BLM Director.

10. The EA is then revised, if necessary, and a decision record is issued with a description of the comments and(or) protests on the proposed decisions, along with an explanation of how the comments and(or) protests were answered or resolved If appropriate, the decision record will incorporate additional or changed land-use planning decisions, thereby amending the RMP.

11. If warranted by the planning review, a detailed recreation project plan, and other activity or implementation plans (see Glossary) will be prepared. Additional opportunities for public participation will be provided when these actions are conducted.

Issues and Planning Criteria

Issues

Public scoping opportunities and notifications included a meeting with the Big Horn County Commissioners on March 17, 1998; media releases and a planning review notice in the *Federal Register*; tours of the discovery area by Bighorn Basin school groups; an on-site informational sign requesting comments, with comment sheets available at the visitor registration box; an evening presentation by scientific researchers ("Insights on the Tracksite") on June 22, 1998 at the Shell Community Hall; and scoping meetings in Shell, Greybull, and Worland during the week of September 14, 1998. The Red Gulch Dinosaur Tracksite has also been featured in news pieces aired on television and the Internet. Since August 1998, the Wyoming BLM Internet site has devoted several pages to the tracksite, including a notice about the Worland Field Office's planning review and a request for comments.

Based on the public's input and analysis by the BLM interdisciplinary team, the following issues have been identified.

1. Whether the area should be managed for scientific research, public education, and recreation with the development of interpretive signs and facilities.

2. Whether the area should be managed primarily for scientific research with little or no development.

3. Whether the area should be designated an ACEC to emphasize the protection of important fossil resources.

4. Whether the area should be included within the West Slope of the Bighorn Mountains SRMA to allow for more intensive recreation management.

5. Whether commercial outfitters should be allowed to take visitors on tours of the tracksite.

6. Whether withdrawing some or all of the area from mining claim development would be necessary.

7. Whether other measures, in addition to those required by the Washakie RMP, are necessary to protect the tracks from surface-disturbing activities. (See Glossary and Appendix.)

Planning Criteria

Planning criteria are the constraints or ground rules which guide planning and the scope of the various management options and alternatives that are considered in the environmental analysis. The following are planning criteria for this planning review.

1. The planning review will focus on the potential environmental consequences of reasonably foreseeable activities in the planning review area, including livestock grazing, mineral exploration and development, construction of rights-of-way, motor vehicle travel, recreational use, and tourism.

2. A consistent aspect of the planning review will be the use of mitigation or protective measures to avoid or reduce the adverse effects of surface-disturbing activities. These measures are based on using the *Wyoming BLM Mitigation Guidelines for Surface-Disturbing and Disruptive Activities* which represent statewide BLM policy. (See Appendix.) Mitigation or protective measures may

vary by alternative but would be applied as land-use conditions to (a) minimize soil movement; (b) minimize disturbance of vegetation in sensitive areas such as riparian areas; (c) protect important cultural and paleontological resources, recreational values, and wildlife resources (including threatened or endangered species); and (d) protect scenic qualities.

3. The relevance and importance criteria for ACEC designation are being evaluated as part of the planning review to identify and protect any "...significant historic, cultural, or scenic value...or other natural systems or processes..." including but not limited to rare or sensitive paleontological resources. (See Glossary and "Paleontological Resources" in the Affected Environment section of this EA.)

4. The planning review will not determine the specific design or location of any interpretive or recreational facilities to be developed at the tracksite. If warranted by the planning review, those decisions will be made in a separate recreation project plan, or other activity plan.

5. In the course of conducting the planning effort, public lands along waterways were reviewed to determine their eligibility for inclusion in the National Wild and Scenic River System. No public lands were found to meet the eligibility criteria.

CONFORMANCE STATEMENT

The land use and resource management decisions in the Washakie Resource Management Plan (September 2, 1988) describe the current general management direction for the Washakie Planning Area, including management of paleontological resources. The appendix to this document lists the Washakie RMP management decisions that apply to public lands within the planning review area.

Alternatives 2 and 3 of this EA would not be in conformance with the Washakie RMP. The designation of an ACEC, the designation of an SRMA, the pursuit of a withdrawal from mineral location under the 1872 Mining Law, or the prohibition of other surface-disturbing activities in the planning review area would require an amendment to the Washakie RMP.

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

Based on the analysis of potential environmental impacts resulting from any of the alternatives addressed in this environmental assessment, it has been determined that impacts are not expected to be significant and an environmental impact statement is not needed.

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ALTERNATIVES INCLUDING THE PREFERRED

ALTERNATIVES ANALYZED IN DETAIL

Table 1 compares three alternatives for managing the Red Gulch Dinosaur Tracksite. Table 2 describes and compares the anticipated environmental consequences of implementing these alternatives. (See the Environmental Consequences section of this document.)

OTHER MANAGEMENT OPTIONS AND ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

A wide range of management options was originally considered in developing the alternatives addressed in this EA. Options considered but not analyzed in detail were:

— Closing some or all of the tracksite to entry under the land laws. This option was determined to be unnecessary because the land laws let BLM decide whether public lands will be sold, exchanged, or otherwise transferred or disposed. The BLM's decision in response to a proposal to dispose of the public lands in the planning area would be based on an evaluation of resource benefits and risks, and would include opportunities for public participation. Any public land disposal that would be detrimental to important paleontological resources would be rejected.

— Establishing an ACEC and mineral withdrawal on just 40 acres where dinosaur tracks were discovered in 1997. Although this discovery area has received most of the scientific research and visitor use, it is likely that dinosaur tracks on public lands throughout the tracksite are just as important, rare, and irreplaceable; and therefore equally deserving of study, special management, and protection.

— Closing some or all of the tracksite to oil and gas leasing. This option was considered but was *not* analyzed in detail because the same protection can be accomplished through a less restrictive "no surface occupancy" (NSO, see Glossary) requirement. By leasing with an NSO requirement, the tracksite would be protected while subsurface oil and gas could be explored through directional drilling. The federal government would collect royalties on the mineral production, and knowledge of the local geology might be increased through the study of well logs.

— Limiting motorized vehicle use to "designated" roads and trails. This option would involve the closing and blocking off of some roads and trails in the planning review area and the designation of other routes (with white arrow signs) for vehicle use. Pursuant to the Washakie RMP, all motorized vehicles (including all-terrain vehicles) are limited to existing roads and trails already. Driving off-road, along with establishing new roads and trails by driving, is prohibited. (For this planning review, "existing roads and trails" in the planning review area include only those roads and trails shown on the 1989 edition of BLM's Worland 1:100,000 scale topographic and surface management status map.) The "existing roads and trails" requirement is adequate to protect paleontological resources. That requirement could be made known through an informational sign. However, if unauthorized off-road use occurs, any damage would be reclaimed. The area would be patrolled to further guard against off-road driving.

— Prohibiting the hobby collection of invertebrate fossils to preserve qualities of naturalness in the area. Throughout the Bighorn Basin, exposures of the Sundance Formation have long served as field trip destinations for the collection of invertebrate fossils including belemnites ("squid tails"), *Gryphaea* ("devil's toenails"), crinoid stems, and other sea creatures. Many of the rock layers within the Sundance Formation are composed almost entirely of fossil invertebrates. As these layers weather and erode, the shells and shell fragments break apart within the soil. Rain and windstorms regularly uncover more fossils. It is legal to collect these invertebrate fossils on BLM-administered public lands. The option of prohibiting hobby collection of invertebrates was determined to be unnecessary because of the huge supply of the fossils. However, the BLM would monitor and manage invertebrate fossil collecting, if necessary, to maintain the tracksite's natural and aesthetic qualities. (This is described under "Recreation Management" in Table 1.)

Table 1
Management Actions by Alternative

The management actions for the land uses or resources listed below might vary in part from those described in the Washakie RMP. The management actions for air quality, hazardous materials, hazardous wastes, visual resources, water quality, and wildlife habitat would remain the same as described in the Washakie RMP and as shown in the Appendix to this document.

Land Use or Resource	**Alternative 1** **No Action (Continue Existing Management)**	**Alternative 2** **Management for Scientific Research**	**Alternative 3** **Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)**
Special Management Designations	No similar action.	The Red Gulch Dinosaur Tracksite Area of Critical Environmental Concern (ACEC) would be designated on about 1,800 acres of BLM-administered public land surface within the Sundance Formation where dinosaur tracks are known or anticipated to exist.	Same as Alternative 2.
	No similar action.	The ACEC designation would highlight the dinosaur tracks for special management and protection, with emphasis on scientific research.	The ACEC designation would highlight the dinosaur tracks for special management and protection, with emphasis on scientific research, public education, and recreation.
	No similar action.	The Red Gulch Dinosaur Tracksite and adjacent public lands lying north of the Red Gulch/Alkali National Back Country Byway, starting at the byway's junction with U.S. Highway 14, would be incorporated into the West Slope of the Bighorn Mountains SRMA. (The SRMA, originally designated in the 1988 Washakie RMP on about 241,000 public land acres would grow by about 13,000 public land acres.)	Same as Alternative 2.

Table 1
Management Actions by Alternative

The management actions for the land uses or resources listed below might vary in part from those described in the Washakie RMP. The management actions for air quality, hazardous materials, hazardous wastes, visual resources, water quality, and wildlife habitat would remain the same as described in the Washakie RMP and as shown in the Appendix to this document.

	Alternative 1	Alternative 2	Alternative 3
Land Use or Resource	**No Action (Continue Existing Management)**	**Management for Scientific Research**	**Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)**
Limitations on Surface-Disturbing Activities	Based on site-specific environmental analyses, surface-disturbing activities (see Glossary) would be prohibited or restricted during wet weather, on frozen soils, and on slopes greater than 25 percent. Surface-disturbing activities would be avoided in the immediate vicinity of significant cultural and paleontological resources.	Same as Alternative 1.	Same as Alternative 1.
	No similar action.	Surface-disturbing activities would be prohibited on the tracksite. This requirement would not apply to the placement of a few interpretive signs.	Surface-disturbing activities would be prohibited on the tracksite. This requirement would not apply to the construction of roads, trails, interpretive signs, and other facilities to enhance public education and recreation.
Cultural and Paleontological Resources Management	Site-specific surveys for cultural and paleontological resources would be conducted before surface-disturbing activities are approved.	Same as Alternative 1.	Same as Alternative 1.

Table 1
Management Actions by Alternative

The management actions for the land uses or resources listed below might vary in part from those described in the Washakie RMP. The management actions for air quality, hazardous materials, hazardous wastes, visual resources, water quality, and wildlife habitat would remain the same as described in the Washakie RMP and as shown in the Appendix to this document.

	Alternative 1	**Alternative 2**	**Alternative 3**
Land Use or Resource	**No Action (Continue Existing Management)**	**Management for Scientific Research**	**Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)**
Cultural and Paleontological Resources Management (Continued)	All scientific and educational researchers studying the dinosaur tracks or working in that geologic horizon would be required to obtain a paleontological resources use permit.	Same as Alternative 1.	Same as Alternative 1.
	The BLM would consider requests for paleontological research case by case.	The BLM would encourage paleontological research and would facilitate cooperation and information-sharing among the scientists. The BLM would conduct some research through its National Applied Resource Sciences Center. Results of all research would be made available through publications, the Internet, and other educational materials.	Same as Alternative 2.
	No similar action.	To the extent possible, BLM staff and(or) volunteers would respond to questions from visitors while researchers are working. A goal would be to maintain the researchers' efficiency.	Same as Alternative 2.

Table 1
Management Actions by Alternative

The management actions for the land uses or resources listed below might vary in part from those described in the Washakie RMP. The management actions for air quality, hazardous materials, hazardous wastes, visual resources, water quality, and wildlife habitat would remain the same as described in the Washakie RMP and as shown in the Appendix to this document.

Land Use or Resource	Alternative 1 No Action (Continue Existing Management)	Alternative 2 Management for Scientific Research	Alternative 3 Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)
Fire Management	The use of heavy equipment to construct fire lines and the use of chemical and dye retardants would be allowed.	The use of heavy equipment to construct fire lines and the use of chemical and dye retardants would be prohibited.	Same as Alternative 2.
Lands and Realty Management	The tracksite would be open for rights-of-way development. Proposals would be addressed case by case with emphasis on avoiding certain conflict or sensitive areas, including significant paleontological resources.	The development of rights-of-way would be prohibited on the tracksite. (This would not apply to maintenance of the Red Gulch/Alkali National Back Country Byway.)	The development of rights-of-way would be prohibited on the tracksite. (This would not apply to maintenance of the Red Gulch/Alkali National Back Country Byway or to relocation of some road segments if determined to be appropriate through detailed activity planning.)
Livestock Grazing Management	The entire tracksite would be open to livestock grazing.	Same as Alternative 1.	Livestock grazing would be excluded on a few acres of the tracksite to avoid inadvertent damage to interpretive signs and facilities. Authorized livestock grazing levels in the Potato Allotment would not be modified as a result of this action.
Minerals Management ***Leasable minerals***	The tracksite would be open to the consideration of mineral leasing, exploration, and development.	Same as Alternative 1.	Same as Alternative 1.

Table 1
Management Actions by Alternative

The management actions for the land uses or resources listed below might vary in part from those described in the Washakie RMP. The management actions for air quality, hazardous materials, hazardous wastes, visual resources, water quality, and wildlife habitat would remain the same as described in the Washakie RMP and as shown in the Appendix to this document.

Land Use or Resource	Alternative 1 No Action (Continue Existing Management)	Alternative 2 Management for Scientific Research	Alternative 3 Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)
Minerals Management ***Leasable minerals*** **(Continued)**	Mitigation requirements to protect paleontological and other resources would be applied as stipulations on mineral leases or as conditions of approval on exploration and development activities.	Same as Alternative 1.	Same as Alternative 1.
	No similar action.	Surface-disturbing activities associated with federal mineral leasing exploration and development would be prohibited on the tracksite. Leases would have "no surface occupancy" (NSO) stipulations. Additionally, the NSO stipulation would apply to any federal oil and gas development beneath 120 acres of privately-owned surface in section 20, T. 52 N., R. 91 W.	Same as Alternative 2.
Locatable minerals	The tracksite would be open to the location and development of mining claims.	The tracksite would be closed to the location and development of mining claims. The BLM would pursue a withdrawal from mineral location under the 1872 Mining Law on these lands.	Same as Alternative 2.

Table 1
Management Actions by Alternative

The management actions for the land uses or resources listed below might vary in part from those described in the Washakie RMP. The management actions for air quality, hazardous materials, hazardous wastes, visual resources, water quality, and wildlife habitat would remain the same as described in the Washakie RMP and as shown in the Appendix to this document.

	Alternative 1	**Alternative 2**	**Alternative 3**
Land Use or Resource	**No Action (Continue Existing Management)**	**Management for Scientific Research**	**Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)**
Off-Road Vehicle Management	Motorized vehicle use, including ATVs, would be limited to existing roads and trails.	Same as Alternative 1.	Same as Alternative 1.
Recreation Management	Existing recreational opportunities for hiking, sightseeing, hunting, and noncommercial collection of invertebrate fossils would continue and visits to the tracksite by individuals and organized groups would be allowed. The BLM would provide on-site facilities and services, such as vehicle barriers and signs for direction, safety, and resource protection, to make visits to the tracksite as safe as reasonably possible.	Same as Alternative 1.	Same as Alternative 1.
	When requested, BLM would lead field trips to the tracksite.	When requested, BLM and volunteers would lead field trips to the tracksite.	Same as Alternative 2.
	No special management actions would be undertaken to emphasize the importance of the dinosaur tracks for scientific research, public education, or recreation.	Management of the tracksite would emphasize scientific research and a few interpretive signs would be placed for public education.	Management of the tracksite would emphasize scientific research, public education, and recreation.

Table 1
Management Actions by Alternative

The management actions for the land uses or resources listed below might vary in part from those described in the Washakie RMP. The management actions for air quality, hazardous materials, hazardous wastes, visual resources, water quality, and wildlife habitat would remain the same as described in the Washakie RMP and as shown in the Appendix to this document.

	Alternative 1	Alternative 2	Alternative 3
Land Use or Resource	**No Action (Continue Existing Management)**	**Management for Scientific Research**	**Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)**
Recreation Management (Continued)	No similar action.	No similar action.	A recreation project plan or other activity plan would be developed. Preparation of this plan would include opportunities for public participation. The design and location of roads, trails, signs, and other facilities as identified in the plan would emphasize the protection of paleontological resources and have a goal of increasing the public's awareness, understanding, and appreciation of the tracks.
	No similar action.	No similar action.	If warranted, the tracksite could be identified as a recreation fee collection area. This option would be considered during activity planning and the public would have opportunities to participate in the decisionmaking.

Table 1
Management Actions by Alternative

The management actions for the land uses or resources listed below might vary in part from those described in the Washakie RMP. The management actions for air quality, hazardous materials, hazardous wastes, visual resources, water quality, and wildlife habitat would remain the same as described in the Washakie RMP and as shown in the Appendix to this document.

Land Use or Resource	Alternative 1 No Action (Continue Existing Management)	Alternative 2 Management for Scientific Research	Alternative 3 Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)
Recreation Management (Continued)	No similar action.	No similar action.	Some interpretive facilities would be established away from the tracksite near the junction of the Red Gulch/Alkali National Back Country Byway and U.S. Highway 14. These facilities would highlight the tracksite as well as other nearby paleontological resources on public land. If warranted, the BLM could grant itself a right-of-way to protect the immediate area of the facilities from conflicting land uses.
	The Worland BLM Ranger, other BLM personnel, and volunteers would conduct patrols of the area to guard against vandalism and unauthorized removal of public resources. The BLM would pursue agreements with Big Horn County for supplemental patrols by the Sheriff's Department and other law enforcement assistance.	Same as Alternative 1.	Same as Alternative 1.

Table 1
Management Actions by Alternative

The management actions for the land uses or resources listed below might vary in part from those described in the Washakie RMP. The management actions for air quality, hazardous materials, hazardous wastes, visual resources, water quality, and wildlife habitat would remain the same as described in the Washakie RMP and as shown in the Appendix to this document.

Land Use or Resource	Alternative 1 No Action (Continue Existing Management)	Alternative 2 Management for Scientific Research	Alternative 3 Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)
Recreation Management (Continued)	Portions of the Red Gulch/Alkali National Back Country Byway would be graveled to provide safer access to the tracksite.	Same as Alternative 1.	Same as Alternative 1.
	Visitors to the tracksite would be allowed to collect invertebrate fossils in reasonable quantities for their personal use. The specimens may not be sold, bartered, or traded.	Same as Alternative 1.	Same as Alternative 1.
	No similar action.	If monitoring shows that invertebrate fossil collecting is significantly impairing visual resources, the activity would be limited or prohibited.	Same as Alternative 2.
	The BLM would not allow commercial outfitters to take visitors on tours of the tracksite.	The BLM would allow one commercial outfitter to take visitors on tours of the tracksite.	On a case-by-case basis, the BLM would allow commercial outfitters to take visitors on tours of the tracksite. Analysis conducted for an activity plan and monitoring would establish how much commercial use could be allowed.

Table 1
Management Actions by Alternative

The management actions for the land uses or resources listed below might vary in part from those described in the Washakie RMP. The management actions for air quality, hazardous materials, hazardous wastes, visual resources, water quality, and wildlife habitat would remain the same as described in the Washakie RMP and as shown in the Appendix to this document.

	Alternative 1	Alternative 2	Alternative 3
Land Use or Resource	**No Action (Continue Existing Management)**	**Management for Scientific Research**	**Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)**
Recreation Management (Continued)	The BLM would monitor recreational activity using traffic counters and by talking to visitors on site. Other information gathering could include using photography to record vegetation changes and collecting statistics on the amount of litter removed.	Same as Alternative 1.	Same as Alternative 1.
Vegetation Management	Noxious weeds and other undesirable vegetation would be controlled in conjunction with local counties; the USDA, Animal and Plant Health Inspection Service; other agencies; and affected interests, consistent with the *Wyoming Record of Decision for the Final EIS Addressing Vegetation Treatment on BLM Lands in the 13 Western States* (BLM 1991).	Same as Alternative 1.	Same as Alternative 1.

Table 1
Management Actions by Alternative

The management actions for the land uses or resources listed below might vary in part from those described in the Washakie RMP. The management actions for air quality, hazardous materials, hazardous wastes, visual resources, water quality, and wildlife habitat would remain the same as described in the Washakie RMP and as shown in the Appendix to this document.

	Alternative 1	**Alternative 2**	**Alternative 3**
Land Use or Resource	**No Action (Continue Existing Management)**	**Management for Scientific Research**	**Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)**
Vegetation Management (Continued)	Control of noxious weeds may include manual, mechanical, biological, or chemical methods. If herbicides are proposed for use, those that are effective on the target weed species and that have minimum toxicity to wildlife and fish will be selected.	Same as Alternative 1.	Same as Alternative 1.
	Consistent with the Decision Record for *Implementation of Noxious Weed-Free Forage on Public Lands in the Worland District* (BLM 1997) the use of certified noxious weed-seed free vegetative products will be required.	Same as Alternative 1.	Same as Alternative 1.

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AFFECTED ENVIRONMENT

RED GULCH Dinosaur TRACKSITE

INTRODUCTION

This section describes elements of the environment in the planning review area which may be affected by the alternatives described in Table 1.

None of the alternatives would affect air quality, prime or unique farmlands, floodplains, Native American religious concerns, wildlife, threatened or endangered species, hazardous or solid wastes, water quality, wetlands or riparian areas, wild and scenic rivers, or wilderness. Some of these elements do not occur in the planning review area, and for some that do occur, the types of anticipated actions and the mitigation measures to be applied indicate that the effects would be insignificant.

CULTURAL AND PALEONTOLOGICAL RESOURCES

Cultural Resources

The Bighorn Basin of Wyoming contains cultural resources indicating at least 12,000 years of human occupation. A detailed cultural resource inventory was conducted on 40 acres surrounding the initial dinosaur track discovery. Two cultural resource sites were found but determined not eligible for nomination to the National Register of Historic Places.

Paleontological Resources

The Red Gulch Dinosaur Tracksite is the largest tracksite in Wyoming, and one of only a few worldwide from the Middle Jurassic Period (160 million to 180 million years old). Until the tracks were found, most scientists thought the whole Bighorn Basin was covered by an ancient ocean called the Sundance Sea. It seemed that only sea-dwelling creatures could have lived in the area, and dinosaur footprints were not anticipated at all.

The tracksite suggests a large and diverse population of dinosaurs. Scientists want to know what kinds of animals made these tracks. Middle

Jurassic dinosaur skeletons are extremely rare in North America, and there are only a few areas with tracks of this age. With few fossils for comparison, the identity of the Red Gulch track-makers remains something of a mystery. At first glance, scientists think there may have been two kinds of dinosaurs present. Most of the footprints appear to have been made by theropods—meat-eating dinosaurs that walked on their hind legs.

The tracksite is interesting because it is so extensive and unusual in its Middle Jurassic age and geographic occurrence, in what was originally thought to be a sea. The geologic history of the area, once considered to be well understood, needs to be rewritten because of the tracks' discovery.

Research

Researchers studying the tracksite include experts on coastal environments, dinosaur footprints, invertebrate trace fossils, computer mapping and data analysis, and correlating and dating rock layers. The Red Gulch Dinosaur Tracksite scientists will map, measure, describe, and compare the rocks and fossils with other previously studied tracksites. Only a few specimens will be collected, but replicas may be made for distribution to museums and for other purposes. Analyzing what is learned will provide insight into individual and group dinosaur behavior and dynamics, faunal diversity, community structure, and habitat. Ultimately, these studies could tie the Red Gulch Dinosaur Tracksite into a global geological and paleontological framework, as scientists compare the tracksite to other fossil footprints worldwide.

The scientists hope to answer the following questions.

- What kind of animals made these tracks?
- Did they walk on two legs or four?
- Did the dinosaurs live in family groups?
- What was life like for the dinosaurs?
- What did they eat?
- What was the climate like?
- What kind of terrain did the dinosaurs encounter?
- Just how long ago were these tracks made?
- What was the coastline like?
- Were the tracks made in a day or so, or over a period of weeks or months, or were there several episodes of track making?

Some speculation about the Red Gulch Dinosaur Tracksite is already possible. Researchers now think:

- There were several kinds of dinosaurs. Many appear to be small theropods. (Some theropods survived right up until the extinction of the last dinosaurs, 65 million years ago.)

- Tracks go in all directions, crossing each other in some places. Some footprints are small, not more than three and a half inches long; others are large, up to 8 inches long. The smallest ones may have been made by juveniles, or they could be the footprints of tiny adult dinosaurs.

Remote control plane used by the BLM's National Applied Resource Sciences Center (NARSC) for aerial photography of the tracksite.

- Ocean waters did not cover all of Wyoming during the Middle Jurassic. At the Red Gulch Dinosaur Tracksite, dinosaurs probably were walking on a limy ooze that formed on tidal flats. A rock layer higher in the Sundance Formation is interpreted as a sand dune made of tiny limestone pellets blown by the wind.

Tracksite Protection

At least some of the dinosaur tracks have been exposed to surface weathering for a few hundred years. This is evident because lichen, an extremely slow-growing plant in desert environments, covers some of the tracks. But despite the lichen growth and long exposure, these tracks are in good condition.

Other tracks have been exposed for a shorter period, especially where the tracks were discovered at the base of a broad gully. At that location, storm runoff along the tilted track layer is eroding the southwestern bank of the gully, exposing a few tracks each year.

A temporary sign placed by BLM in this area warns against marking or standing directly on the tracks. Since March 1998, a few of the tracks have been damaged by the application of foreign substances. These substances have included chalk, plaster for making casts, and soft drinks poured into a few tracks. Plaster appears to cause the most damage because a small layer of the track is often removed with the cast, ruining the track for scientific research. In addition, wet plaster spilled during cast-making can weaken the limestone surface of nearby tracks.

So far, there appears to be little, if any, damage from people stepping on tracks. Unnecessary stepping on tracks can be avoided, even where the tracks are concentrated.

There is no evidence of livestock trampling the tracks. Wastes from visitors' pets are sometimes evident and may be more of a hazard to the tracks.

There is always a possibility that tracks might be removed by people or randomly destroyed. Removal of individual tracks would be difficult because the limestone is brittle and more likely to break in small pieces than to remain in a slab.

Special Management

The Red Gulch Dinosaur Tracksite meets both the relevance and importance criteria for ACEC designation. The tracksite has relevance as an important paleontological resource because (1) it is so extensive, (2) it provides unique opportunities for the study of dinosaur behavior and interaction, and (3) its geographic occurrence and Middle Jurassic age are changing scientists' ideas about ancient environments in the Sundance Formation.

The tracksite meets the importance criteria for ACEC designation because (1) it has qualities of more than local significance which give it special worth, consequence, meaning, and distinctiveness, (2) there are qualities and circumstances making the tracksite fragile, sensitive, rare, irreplaceable, unique, exemplary, and vulnerable to adverse change, and (3) the tracksite warrants protection in order to satisfy national priority concerns and to carry out the mandates of the Federal Land Policy and Management Act of 1976.

Other Fossils

In addition to the tracks, there could be other vertebrate fossils in the planning review area. Elsewhere in the Bighorn Basin, the Sundance Formation has yielded the bones of marine reptiles at several locations, while the Morrison Formation (which lies in contact with the Sundance Formation) is probably the most prolific and significant formation in all of North America for dinosaur discoveries. Most notably, in 1991 the fully-articulated skeleton of a juvenile *Allosaurus*, commonly known as "Big Al," was unearthed from the Morrison Formation 14 miles north of the tracksite.

The *Allosaurus* discovery was adjacent to the Howe Quarry. That quarry, developed on private land in the 1930s, produced an immense array of both theropod and sauropod dinosaur fossils from the Morrison Formation.

The Cloverly Formation is also well known for yielding dinosaur remains such as the sickle-clawed *Deinonychus* and primitive mammals.

Abundant invertebrate fossils can be found in the Sundance Formation. The most common fossils are belemnites, *Gryphaea*, and crinoid stems. *Pentacrinus*, a crinoid having a star-shaped stem, serves as an excellent index fossil near the base of the formation.

FIRE

Wildland fires are uncommon in the planning review area because the vegetation is sparse and discontinuous. But if a fire gets started in this part of the Bighorn Basin, it is often considered desirable (BLM 1998). The main benefit is to improve biological diversity in the predominantly uniform sagebrush and saltbush vegetation.

GEOLOGY AND MINERAL RESOURCES

Geology

From oldest to youngest, the geologic formations exposed in and near the planning review area are the Jurassic age Gypsum Springs, Sundance, and Morrison formations and the Cretaceous age Cloverly Formation, Thermopolis Shale, Mowry Shale, Frontier Formation, and Cody Shale (see Figure 1).

The crest of the Cherry Anticline extends diagonally through the planning review area, running roughly parallel to and about 0.5 mile north of the Red Gulch/Alkali National Back Country Byway. An anticline is a dome-like fold of rock which may serve as a trap for oil and gas. Most of the anticlines in the Bighorn Basin have been drilled for oil and gas at one time or another.

Southwest of the planning review area, Potato Ridge is a sharply-tilted hogback of crusty shales, sandstones, and valuable bentonite deposits.

Mineral Resources

Oil and Gas

Oil and gas are produced from many fields in the Bighorn Basin. Production is realized from both structural and stratigraphic traps. Of those formations which are present on or beneath the planning review area, production has been established from the Flathead, Bighorn, Madison, Tensleep, Phosphoria, Chugwater, and Sundance Formations. The nearest production is from the Sagebrush Field, approximately 6 miles south-southwest of the planning review area. This field produces from a small structural trap in the Phosphoria Formation. The nearest production from a stratigraphic trap comes from the Cottonwood Creek Field located approximately 25 miles south of the planning review area. This field also produces from the Phosphoria Formation.

The U.S. Geological Survey (Fox and Dolton, 1989) has highlighted several oil and gas plays in the Bighorn Basin. Oil and gas plays are geologic prospects where there is a possibility of

Figure 1 - Geology In and Near the Planning Review Area

			Approximate Thickness (Feet)	Lithologic Description
MESOZOIC	CRETACEOUS	Cody Shale	1700'	Gray shales, siltstones and sandstones. Some bentonite beds. Marine invertebrate fossils common.
		Frontier Formation	800'	Interbedded buff-gray sandstones and shale. Commercial bentonite beds common.
		Mowry Shale	400'	Gray siliceous shale. Fossil fish scales abundant. Commercial bentonite beds common.
		Thermopolis Shale	600'	Soft black shales. Muddy sandstone member in middle portion of formation. Commercial bentonite beds common.
		Cloverly Formation	200'	Conglomerates at base with rusty sandstones at top. Contains sparse unarticulated dinosaur bones.
	JURASSIC	Morrison Formation	200'	Varicolored claystones, sandstones, & modular limestonse. Dinosaur bones present but rare in occurrence.
		Sundance Formation	200'	Gray-green sandstone, limestone, and shale. Marine invertebrate fossils common. Dinosaur tracks.
		Gypsum Springs Formation	200'	Interbedded red-pink shale & gypsum beds. Commercial gypsum deposits locally.
	TRIASSIC	Chugwater Formation	900'	Red siltstones and sandstones with some thin limestone beds.
		Dinwoody Formation	50-100'	Drab-yellow dolomitic siltstones.
PALEOZOIC	PERM	Phosphoria Formation	300'	Gray-brown dolomites, limestones, sandstones, and shales.
	PENN	Tensleep Sandstone	400'	Massive buff-gray cliff-forming cross-bedded sandstoner.
		Amsden Formation	200'	Buff-red dolomitic shales and sandstones.
	MISS	Madison Limestone	700'	Gray limestone and dolomitic beds. Marine invertebrate fossils (bracheopods, corals, crinoids, etc.) common.
	ORD	Bighorn Dolomite	300'	Light gray massive cliff-forming dolomite.
	CAMBRIAN	Gallatin Formation	200'	Purple-gray hard limestone
		Gros Ventre Formation	500'	Soft green slope-forming shales and hard thin limestones.
		Flathead Sandstone	300'	Fine to coarse red sandstone. Conglometric at base. Worm trails & burrows common.
PRECAMBRIAN			Basement Rocks	Metamorphic and intrusive igneous rocks; amphibolite, schist, granite.

commercial quantities of oil or gas being discovered. The planning review area is within the Basin Margin Anticline play and immediately adjacent to the Phosphoria Stratigraphic play. The Sagebrush and Cottonwood Creek fields are structural and stratigraphic examples of these plays.

There have been 16 oil and gas exploration wells drilled within 1 mile of the planning review area (BLM Well Records). A number of the wells were drilled in the 1950s and 1960s along the crest of the Cherry Anticline. Another flurry of activity occurred in the early 1980s, probably to test for stratigraphic traps in the Phosphoria Formation. The most recent well to be drilled within 1 mile of the planning review area was abandoned in 1984. The deepest formation tested in the 16 wells was the Tensleep Sandstone. Oil staining was noted in cores of the Phosphoria Formation in two of the wells. Minor initial production of 2.5 barrels of oil per day came from a third well. This well was drilled in 1960 and abandoned in 1961 with no figures available on total production.

Based on this exploration activity and the lack of significant hydrocarbon discoveries, the potential for commercial development of oil or gas in the planning review area appears to be low.

Locatable Minerals

Locatable minerals on public lands are those that may be developed on mining claims which are staked, or "located," under the 1872 Mining Law. Near the tracksite, known occurrences of locatable minerals are confined to bentonite deposits along Potato Ridge. The Thermopolis Shale, Mowry Shale, Frontier Formation, and Cody Shale along Potato Ridge are encumbered, all or in part, by mining claims and mineral patent applications. This area has minable deposits of bentonite, but all are outside the planning review area.

The rocks mapped together as the Cloverly and Morrison formations (undivided), lying between the Sundance Formation and the Thermopolis Shale, have low potential for the occurrence of uranium minerals. Minor occurrences of uranium minerals exist outside the planning review area where they are often associated with carbonaceous sands and dinosaur bones (Harris, 1983). Typically, the deposits are spotty, small, and lack economic viability.

The Sundance Formation, which contains all the known dinosaur tracks in the planning review area, is not known to have any potential for the occurrence of locatable minerals. (Tracks and other fossils are not locatable under the 1872 Mining Law.)

LANDS AND REALTY

The BLM's Red Gulch/Alkali National Back County Byway crosses the tracksite from northwest to southeast. This road was graveled recently for a distance of about 5.2 miles, from its junction with U.S. Highway 14 to about the middle of the tracksite.

The northeastern part of the tracksite shares a 2-mile border with state of Wyoming land. Approximately 160 acres of privately-owned surface with federally-owned oil and gas are within 0.25 mile of the dinosaur track discovery area.

LIVESTOCK GRAZING

The tracksite is in the Potato Allotment grazed by A-Lazy-J Land Company. An allotment management plan for the Potato Allotment called for the construction of fences and livestock water to support a rest-rotation grazing system. The pastures are lightly grazed for short periods during the spring and used again during the winter. A major objective of the allotment management plan was to improve range condition. In the most recent rangeland program summary for the Washakie Resource Area (BLM 1994) the plan was reported to be successful.

RECREATION

In 1997, before the announcement that dinosaur tracks had been discovered, the Red Gulch/Alkali National Back Country Byway was travelled by about 1,500 vehicles, containing an estimated 5,000 visitors. In the six months following the first media reports of the tracks in March 1998, the number of vehicles and visitors more than tripled. Based on information obtained from traffic counters, it is estimated that more than 18,000 people have visited the tracksite.

On June 20, 1998, a visitor registration box was posted near the dinosaur track discovery area, just off the byway. Between that date and October 1, 1998, 375 parties signed the register. The number of people in these parties totalled 1,310. The largest single party on the register contained 46 people. About one-third of the parties included a person from Wyoming. At least 18 parties were mixed with people from Wyoming and other areas. This suggests that local people took visiting friends and relatives to the tracksite. Altogether, 41 states and 5 foreign countries (Canada, France, Germany, Italy, and Switzerland) were represented by these visitors.

Most visitors stayed in the area for 15 to 45 minutes, often depending on how soon they were able to discern the tracks. Many people, after seeing the tracks along the byway went exploring in the sagebrush and draws, looking for other tracks and being involved in nature study. Along with being interested in the tracks, people enjoyed collecting invertebrate fossils and were curious about how the site was discovered and how the other biologic and sedimentary structures, such as shrimp burrows and ripple marks, were formed.

The Red Gulch/Alkali National Back Country Byway was dedicated in 1993. The interpretative theme for the byway is "passage along the foothills." An interpretive brochure developed by the BLM for the byway highlights the Cherry Anticline, the Chugwater Formation and Tensleep Sandstone, the Sioux War Trail, the mail route between Big Horn and Hyattville, and the historic Harvey and Stan Walters homesteads.

The planning review area is identified as "roaded natural" in the BLM's recreation opportunity spectrum. Recreational opportunities in a roaded natural setting involve recreating near other people in an isolated environment. Typical activities are picnicking, bird watching, and driving for pleasure. It is estimated that, before discovery of the dinosaur tracks, about 30 percent of the travel along the byway was solely for recreation. Other uses of the road included access for livestock grazing management and firewood cutting. The use of motorized vehicles on BLM-administered public lands in and near the planning review area is restricted to existing roads and trails.

The planning review area is located within a few miles of the West Slope of the Bighorn Mountains Special Recreation Management Area through which most of the Red Gulch/Alkali National Back Country Byway crosses. Special recreation management areas are public lands administered by the BLM where special or more intensive types of recreation management are needed and greater managerial investments can be anticipated.

At least three businesses are interested in conducting guided tours of the tracksite. Each would require a special recreation permit (SRP) for commercial recreational use (see Glossary). A forth business has expressed interest in exclusive rights to guide tours at the tracksite through a concession permit or lease.

A field geology course offered by Indiana University includes stops at local fossil areas and may include stops at the tracksite. To date, the BLM has not required the school to obtain a permit.

According to BLM's handbook (H-8372-1) on special recreation permits for commercial use, these permits may be issued on a first-come, first-served basis until the affected area's desired use level is reached. The desired use level is determined through analysis of an area's resources, visitor use, and ability to tolerate change without causing recreational experiences and opportunities to be degraded. When an area's desired use level has been reached, no additional permits can be issued.

According to BLM policy, recreation fees should be collected where BLM provides facilities, equipment, or services at federal expense in connection with outdoor recreational use. A recent BLM Washington Office Information Bulletin (IB 99-033, November 12, 1998) provides a list of guidelines to be considered before recreation areas are designated as fee collection areas.

In June 1998, a temporary management plan was formulated to insure that the qualities making the Red Gulch Dinosaur Tracksite important were not damaged or otherwise subjected to adverse change pending the completion of the planning review. The provisions of the temporary management plan, pertaining to recreational use, included the following.

- Public visitation to the tracksite by both individuals and organized groups would continue to be allowed. The BLM would make these visits and experiences as safe as reasonably possible by providing on-site visitor services. Visitor services would consist of temporary facilities such as vehicle barriers, porta-potties, and signs for direction, safety, and resource protection.

- No permanent facilities would be constructed or established to manage the area for recreation, public education, or interpretation pending completion of the planning review.

- The BLM would institute patrols of the area to prevent unauthorized removal of public resources and vandalism. Patrols would be conducted by the Worland BLM Ranger, other BLM personnel, and volunteers.

- The BLM would institute patrols of the area to prevent unauthorized removal of public resources and vandalism. Patrols would be conducted by the Worland BLM Ranger, other BLM personnel, and volunteers.

- All scientific and educational researchers (individuals and institutions) working in the geologic horizon containing dinosaur tracks would be required to obtain a Paleontological Resources Use Permit.

- Portions of the Red Gulch/Alkali National Back County Byway would be graveled to provide safer access to the tracksite.

- Visitors to the tracksite would be allowed to collect invertebrate fossils in reasonable quantities for their personal use. These specimens could not be sold, bartered, or traded.

- The BLM would closely monitor and regulate all surface-disturbing activities within the planning review area.

- Rights-of-way and other authorizations would be approved only for projects which would not significantly disturb the surface or alter the planning review area.

- The issuance of commercial special recreation permits for outfitted tours of the tracksite would not be authorized until and unless a planning decision (through the planning review process) is made that issuing SRPs is in the public's best interest and is the best use of the area's resources.

VEGETATION

The tracksite is sparsely vegetated by sagebrush and Gardner's saltbush. In some areas, bare soil makes up most of the land surface. Spotted knapweed, Russian knapweed, and Russian thistle are noxious weeds which infest portions of the tracksite. Spotted knapweed (see Glossary) ranks as the number one weed problem on rangelands in western Montana and is causing a reduction in desirable plant communities as the weed spreads throughout other western states (Whitson et al. 1992). An area of spotted knapweed, on about 1 acre in the planning review area, is being treated every year.

The tracksite is located within the Shell Valley Special Weed Management Area which is focused on large infestations of Canada thistle and hoary cress (whitetop). It is likely that these weeds are also present in the area of the tracksite.

VISUAL RESOURCES

The planning review area is located in a visual resource management "Class IV" area where allowed changes in the basic elements of the landscape can be significant enough to attract attention and may be the dominant features of the landscape in terms of scale, but the changes should be managed in order to repeat the form, line, color, and texture of the landscape. (See Glossary.)

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

After complete analysis of the alternatives, including the Washakie RMP management decisions listed in the appendix, it was determined that none of the alternatives would affect air quality, prime or unique farmlands, floodplains, Native American religious concerns, wildlife, threatened or endangered species, hazardous or solid wastes, water quality, wetlands or riparian areas, wild and scenic rivers, or wilderness. Some of these elements do not occur in the planning review area, and for some that do occur, the types of anticipated actions and the mitigation measures that would be applied indicate that the effects would be insignificant.

Other elements of the environment in the planning review area that may be affected are described in Table 2, "Environmental Consequences by Alternative" (on the following pages).

Table 2
Environmental Consequences by Alternative

None of the alternatives would affect air quality, prime or unique farmlands, floodplains, Native American religious concerns, wildlife, threatened or endangered species, hazardous or solid wastes, water quality, wetlands or riparian areas, wild and scenic rivers, or wilderness. Some of these elements do not occur in the planning review area, and for some that do occur, the types of anticipated actions and the mitigation measures to be applied indicate that the effects would be insignificant. Other elements of the environment in the planning review area that may be affected are described below.

	Alternative 1	Alternative 2	Alternative 3
Land Use or Resource	**No Action (Continue Existing Management)**	**Management for Scientific Research**	**Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)**
Special Management Designations	No similar effect.	With an ACEC designation, there would be a greater chance for funds to be obtained for things like extra patrols and monitoring to protect the paleontological resources at the tracksite.	Same as Alternative 2.
	No similar effect.	No similar effect.	With an SRMA designation, there would be a greater chance for funds to be obtained for visitor services, including interpretive facilities.
Cultural and Paleontological Resources	Cultural and paleontological resources would be protected through the use of patrols and the enforcement of existing laws, regulations, and policies. Because site-specific surveys would precede surface-disturbing activities, significant cultural and paleontological resources could be protected from these activities.	Same as Alternative 1.	Same as Alternative 1.

Table 2
Environmental Consequences by Alternative

None of the alternatives would affect air quality, prime or unique farmlands, floodplains, Native American religious concerns, wildlife, threatened or endangered species, hazardous or solid wastes, water quality, wetlands or riparian areas, wild and scenic rivers, or wilderness. Some of these elements do not occur in the planning review area, and for some that do occur, the types of anticipated actions and the mitigation measures to be applied indicate that the effects would be insignificant. Other elements of the environment in the planning review area that may be affected are described below.

Land Use or Resource	**Alternative 1** **No Action (Continue Existing Management)**	**Alternative 2** **Management for Scientific Research**	**Alternative 3** **Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)**
Cultural and Paleontological Resources (Continued)	Sporadic unauthorized collection of cultural and paleontological resources would take place although the overall effect probably would not be significant.	Compared to Alternative 1, greater visitor use would increase the potential for unauthorized collecting, but this increased potential would be partially mitigated by the use of a few interpretive signs. Visits to the tracksite by a commercial outfitter would help with site monitoring and protection.	Compared to Alternative 1, greater visitor use would increase the potential for unauthorized collecting, but this increased potential would be mitigated considerably by the use of interpretive signs, the development of well-designed and attractive recreational facilities, and the emphasis on public education. Visits to the tracksite by one or more commercial outfitters would help with site monitoring and protection.
	Scientific research would yield valuable information for BLM and the public.	Scientific research would be encouraged and facilitated, yielding the best possible information for BLM and the public.	As in Alternative 2, scientific research would yield the best possible information for BLM and the public. The public's understanding of this information would increase (compared to the other alternatives) because of the emphasis on public education at the tracksite.

Table 2
Environmental Consequences by Alternative

None of the alternatives would affect air quality, prime or unique farmlands, floodplains, Native American religious concerns, wildlife, threatened or endangered species, hazardous or solid wastes, water quality, wetlands or riparian areas, wild and scenic rivers, or wilderness. Some of these elements do not occur in the planning review area, and for some that do occur, the types of anticipated actions and the mitigation measures to be applied indicate that the effects would be insignificant. Other elements of the environment in the planning review area that may be affected are described below.

	Alternative 1	Alternative 2	Alternative 3
Land Use or Resource	**No Action (Continue Existing Management)**	**Management for Scientific Research**	**Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)**
Cultural and Paleontological Resources (Continued)	Scientific research would lose some efficiency while scientists explain their work to visitors.	Scientific research would be conducted more quickly and efficiently since BLM staff and(or) volunteers would answer many of the visitors' questions.	Same as Alternative 2.
Fire	Cultural and paleontological resources could be inadvertently damaged if wildfires are suppressed using heavy equipment and chemical or dye retardants.	No similar effect.	No similar effect.
Lands and Realty	No similar effect.	The prohibition on rights-of-way development on the tracksite might inconvenience some applicants but not significantly because the potential demand for new rights-of-way is considered to be very low.	Same as Alternative 2.
Livestock Grazing	No similar effect.	No similar effect.	A very small amount of forage would be unavailable for livestock grazing, where livestock would be excluded near interpretive signs and facilities.

Table 2
Environmental Consequences by Alternative

None of the alternatives would affect air quality, prime or unique farmlands, floodplains, Native American religious concerns, wildlife, threatened or endangered species, hazardous or solid wastes, water quality, wetlands or riparian areas, wild and scenic rivers, or wilderness. Some of these elements do not occur in the planning review area, and for some that do occur, the types of anticipated actions and the mitigation measures to be applied indicate that the effects would be insignificant. Other elements of the environment in the planning review area that may be affected are described below.

	Alternative 1	**Alternative 2**	**Alternative 3**
Land Use or Resource	**No Action (Continue Existing Management)**	**Management for Scientific Research**	**Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)**
Minerals ***Leasable Minerals***	No similar effect.	On the tracksite and on 120 acres where BLM administers federal oil and gas beneath privately-owned surface, the cost of any oil and gas exploration would increase because the NSO requirement would make directional drilling necessary.	Same as Alternative 2.
Locatable Minerals	There would be a small chance of nuisance mining claims being staked in the Sundance Formation for the purpose of obtaining dinosaur tracks. Such claims could interfere with scientific research and might require court action to be removed.	Since the Sundance Formation in the planning review area is not known to contain locatable minerals and the potential for their occurrence is low, there would be no adverse effects to mineral development associated with closing the tracksite to the staking of mining claims. There would be no effect on bentonite development along Potato Ridge since that area is outside the tracksite.	Same as Alternative 2.

Table 2
Environmental Consequences by Alternative

None of the alternatives would affect air quality, prime or unique farmlands, floodplains, Native American religious concerns, wildlife, threatened or endangered species, hazardous or solid wastes, water quality, wetlands or riparian areas, wild and scenic rivers, or wilderness. Some of these elements do not occur in the planning review area, and for some that do occur, the types of anticipated actions and the mitigation measures to be applied indicate that the effects would be insignificant. Other elements of the environment in the planning review area that may be affected are described below.

	Alternative 1	**Alternative 2**	**Alternative 3**
Land Use or Resource	**No Action (Continue Existing Management)**	**Management for Scientific Research**	**Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)**
Recreation	Visits to the tracksite would be made as safe as reasonably possible and the area would be protected through the use of on-site facilities and services, such as vehicle barriers and signs for direction, safety, and resource protection. The degree of protection would vary by alternative.	Same as Alternative 1.	Same as Alternative 1.
	The number of visits to the tracksite is estimated to start at about 20,000 people annually and increase by 15 to 20 percent per year for the next five years. After five years, that number would gradually decline to about 15,000 people annually.	The number of visits to the tracksite is estimated to start at about 20,000 people annually and increase by 15 to 20 percent per year for the next five years. After five years that number would gradually decline but less than under Alternative 1, because some visitors would be brought to the tracksite by a commercial guide.	The number of visits to the tracksite is estimated to start at about 20,000 people annually and increase by 20 to 25 percent per year for five years following the development of facilities. After that the increase would level off at 10 percent per year. In addition to the on-site facilities and commercial outfitting, the increase would be associated

Table 2
Environmental Consequences by Alternative

None of the alternatives would affect air quality, prime or unique farmlands, floodplains, Native American religious concerns, wildlife, threatened or endangered species, hazardous or solid wastes, water quality, wetlands or riparian areas, wild and scenic rivers, or wilderness. Some of these elements do not occur in the planning review area, and for some that do occur, the types of anticipated actions and the mitigation measures to be applied indicate that the effects would be insignificant. Other elements of the environment in the planning review area that may be affected are described below.

	Alternative 1	Alternative 2	Alternative 3
Land Use or Resource	No Action (Continue Existing Management)	Management for Scientific Research	Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)
Recreation (Continued)	[See previous page.]	[See previous page.]	with the development of interpretive facilities near the junction of the Red Gulch/Alkali National Back Country Byway and U.S. Highway 14. Those facilities would attract tourists who would not otherwise know about the tracksite.
	Littering and trampling of vegetation would be greatest throughout the 1,800-acre tracksite, compared to the other alternatives. Visitors would pioneer foot trails and drive off-road more often in search of new areas to see dinosaur tracks.	Littering, trampling of vegetation, and off-road driving would be slightly less than under Alternative 1 throughout the tracksite. More use would take place near the dinosaur track discovery area next to the byway, because a few interpretive signs would be placed there.	The emphasis on public education and development of visitor facilities in two specific areas (near the U.S. Highway 14 junction and the dinosaur track discovery area) would reduce the types and severity of impacts associated with dispersed visitor use. Impacts would be more concentrated but also easier to clean up and manage.

Table 2
Environmental Consequences by Alternative

None of the alternatives would affect air quality, prime or unique farmlands, floodplains, Native American religious concerns, wildlife, threatened or endangered species, hazardous or solid wastes, water quality, wetlands or riparian areas, wild and scenic rivers, or wilderness. Some of these elements do not occur in the planning review area, and for some that do occur, the types of anticipated actions and the mitigation measures to be applied indicate that the effects would be insignificant. Other elements of the environment in the planning review area that may be affected are described below.

Land Use or Resource	Alternative 1 No Action (Continue Existing Management)	Alternative 2 Management for Scientific Research	Alternative 3 Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)
Recreation (Continued)	Visitors to the tracksite from outside the Bighorn Basin would improve the local economy.	Same as Alternative 1.	The development of visitor facilities and emphasis on public education would improve the local economy. Visitors from outside the Bighorn Basin would be delayed as much as two hours viewing dinosaur tracks and driving the back country byway. These visitors would be more likely to spend the night or eat a meal in Greybull, Shell, or Hyattville, under this alternative.
Vegetation	The potential for the spread of noxious weeds throughout the tracksite would be greatest, as visitors travel off-road more often in search of new areas to see dinosaur tracks.	The potential for the spread of noxious weeds throughout the tracksite would be slightly less than under Alternative 1.	There would be less chance of visitors spreading noxious weeds throughout the tracksite. Weeds would temporarily increase in a few areas disturbed by the construction of recreation facilities, but with reclamation and continued treatments, all noxious weeds would decline within a few years.

Table 2
Environmental Consequences by Alternative

None of the alternatives would affect air quality, prime or unique farmlands, floodplains, Native American religious concerns, wildlife, threatened or endangered species, hazardous or solid wastes, water quality, wetlands or riparian areas, wild and scenic rivers, or wilderness. Some of these elements do not occur in the planning review area, and for some that do occur, the types of anticipated actions and the mitigation measures to be applied indicate that the effects would be insignificant. Other elements of the environment in the planning review area that may be affected are described below.

	Alternative 1	**Alternative 2**	**Alternative 3**
Land Use or Resource	**No Action (Continue Existing Management)**	**Management for Scientific Research**	**Management for Scientific Research, Public Education, and Recreation (BLM's Preferred Alternative)**
Cumulative Effects	The main cumulative effects would be growth in visitor use, an improved local economy, and the collection of scientific information for the benefit of the local and general public. Sporadic unauthorized collection of cultural and paleontological resources would take place but the overall effect would not be significant.	Same as Alternative 1.	Same as Alternative 1.

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COORDINATION AND PUBLIC PARTICIPATION

RED GULCH Dinosaur TRACKSITE

COORDINATION AND CONSULTATION

This EA was prepared by an interdisciplinary team of BLM specialists from the Worland Field Office and the Wyoming State Office.

Coordination began with discussions and the development of a scientific "protocol" among BLM and the scientific researchers, including Brent Breithaupt, director of the University of Wyoming Geological Museum, Elizabeth H. Southwell, UW Geological Museum researcher; Erik Kvale, Indiana University; Michael Brett-Surman, Smithsonian Institution; Allen Archer, Kansas State University; Gary D. Johnson, Dartmouth College; and Michael T. Naus, South Dakota School of Mines and Technology. These experts provided some of the background information for temporary management of the area and the development of alternatives for this EA.

The Acting Director of the Wyoming State Land Board was given a briefing on the dinosaur tracksite discovery on February 17, 1998, and the Big Horn County Commissioners were briefed one month later.

Local museums, historical societies, and interest groups have been contacted. Topics of discussion included how the fossils should be managed and displayed.

PUBLIC PARTICIPATION

Public scoping opportunities and notifications included a meeting with the Big Horn County Commissioners on March 17, 1998; media releases and a planning review notice in the *Federal Register*; tours of the discovery area by Bighorn Basin school groups; an on-site informational sign requesting comments, with comment sheets available at the visitor registration box; an evening presentation by scientific researchers ("Insights on the Tracksite") on June 22, 1998 at the Shell Community Hall; and scoping meetings in Shell, Greybull, and Worland during the week of September 14, 1998. The Red Gulch Dinosaur Tracksite has also been featured in news pieces aired on television and the Internet. Since August 1998, the Wyoming BLM Internet site has devoted several pages to the tracksite, including a notice about the Worland Field Office's planning review and a request for comments.

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GLOSSARY

Activity Plan (Site-Specific Plan): A plan for managing resource uses or values to achieve specific objectives. For example, an allotment management plan is an activity plan for managing livestock grazing use to improve or maintain rangeland conditions. Activity plans (also known as implementation plans) consider the management of specific geographical areas in more detail than resource management plans, taking into consideration all the resources and land uses that occur in the area.

Area of Critical Environmental Concern (ACEC): An area within the public lands designated for special management attention to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. According to 43 CFR 1601.05a, "The identification of...[an] ACEC shall not, of itself, change or prevent change of the management or use of public lands."

Commercial Recreational Use: Any nonexclusive recreational use of the public lands or related waters for business or financial gain. The collection by a permittee holding a special recreation permit, of any fee, charge, or other compensation which is not strictly a sharing of, or is in excess of, actual expenses incurred for the purposes of the activity or use shall make the activity or use commercial. Use by educational and therapeutic institutions is considered commercial when the above criteria are met. Commercial operations requiring a permit include activities whose base of operations are off the public lands, but who rent equipment or livestock for use on public lands if they, their employees, or agents occupy or use public lands or related waters in connection with their rental program. Profit-making organizations are automatically classified as commercial, even if that part of their activity covered by the permit is not profit-making.

Limited to Existing Roads and Trails: Public lands where motorized vehicle use would be allowed on all existing roads and trails. It is not intended for "existing roads and trails" to include any roads or trails created by the off-road use of motorized vehicles, including ATVs, after the 1988 completion of the Washakie RMP. For this planning review, "existing roads and trails" in the planning review area include only those roads and trails shown on the 1989 edition of BLM's Worland 1:100,000 scale topographic and surface management status map.

Mitigation: Methods used to prevent or reduce effects to resources that might be caused by surface-disturbing activities.

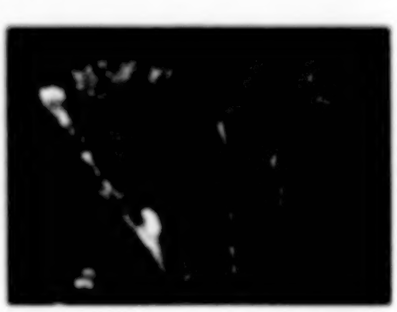
No Surface Occupancy (NSO): The term "no surface occupancy" is used in two ways. It is used in one way to define a no surface occupancy area where no surface-disturbing activities, of any nature or for any purpose, would be allowed. For example, construction, or the permanent or long-term placement of structures or other facilities, for any purpose, would be prohibited in an NSO area.

The other way the "no surface occupancy" term is used is as a stipulation or mitigation requirement for controlling or prohibiting selected land uses or activities that would conflict with other activities, uses, or values in a given area. (This is the way NSO is used in the present dinosaur tracksite planning review.) When used in this way, the NSO stipulation or mitigation requirement is applied to prohibit one or more specific types of land and resource development activities or surface uses in an area, while other—perhaps even similar—types of activities or uses (for other purposes) would be allowed. For example, protecting important rock art relics from destruction may require closing the area to the staking of mining claims and surface mining, off-road vehicle travel, construction or long-term placement of structures or pipelines, power lines, general purpose roads, and livestock grazing. Conversely, the construction of fences to protect the rock art from vandalism or from trampling or breakage by livestock, an access road or trail, and other visitor facilities to provide interpretation and opportunity for public enjoyment of the rock art would be allowed. Further, if there were interest in development of leasable minerals in the area, leases for oil and gas, coal, and so forth could be issued with a "no surface occupancy" stipulation or mitigation requirement for the rock art site, which would still allow access to the leasable minerals from adjacent lands and underground.

The term "no surface occupancy" has no relationship or relevance to the presence of people in the area.

Resource Management Plan (RMP): A plan providing broad guidance and direction for the management of federally-owned lands and resources administered by the Secretary of the Interior through the Bureau of Land Management. The Washakie RMP, approved in 1988, describes BLM's existing management for about 1.2 million acres of public land surface (including public lands at the Red Gulch Dinosaur Tracksite) and 1.6 million acres of federal mineral estate in Big Horn and Washakie counties.

Special Recreation Management Area (SRMA): Public lands administered by the Bureau of Land Management where special or more intensive types of recreation management are needed and greater investments for recreation management can be anticipated.



Spotted Knapweed (*Centaurea maculosa*): A biennial or usually short-lived perennial with a stout taproot. It can have one or more stems, branched 1 to 3 feet tall; with basal leaves up to 6 inches long, blades narrowly elliptic to oblanceolate, entirely to pinnately parted; principal stem leaves pinnately divided. Flowering heads are solitary at end of branches; involucral bracts stiff and tipped with a dark comblike fringe. The ray flowers are pinkish-purple or, rarely, cream-colored. Fruits are about 1/8-inch long, tipped with a tuft of persistent bristles.

Spotted knapweed, which was introduced from Eurasia as a contaminant of alfalfa and clover seed, ranks as the number one weed problem on rangeland in western Montana and Wyoming. Other western states are experiencing a reduction in desirable plant communities as this species is allowed to spread. Knapweeds readily establish themselves on any disturbed soils, and their early spring growth makes them competitive for soil moisture and nutrients. There is some evidence that knapweeds release chemical substances which inhibit surrounding vegetation. The flowering period extends from June to October.

Surface-Disturbing Activities (or Surface Disturbance): The physical disturbance and movement or removal of the land surface and vegetation. It ranges from the very minimal to maximum types of surface disturbance associated with such things as off-road vehicle travel or use of mechanized, rubber-tired, or tracked equipment and vehicles; some timber cutting and forest silvicultural practices; excavation and development activities associated with the use of heavy equipment for road, pipeline, power line, and other types of construction; blasting; strip, pit, and underground mining and related activities, including ancillary facility construction; oil and gas well drilling and field construction or development and related activities; range improvement project construction; and recreation site construction.

Mitigation of surface-disturbing activities centers around surface reclamation and the control and prohibition of surface uses. Mitigation is associated with concerns for such things as movement of disturbed or denuded soil (by water, air, or gravity); erosion; water quality (sedimentation, salinity, pollution); wildlife habitat (vegetative and spatial, aquatic or terrestrial); vegetative composition, cover or productive capacity (quality, quantity) for consumptive and nonconsumptive uses (grazing, scenic values, watershed stability); surface and subsurface cultural and paleontological values; and other subsurface values (cave or karst systems, aquifers).

Visual Resource Management: The planning and implementation of management objectives for maintaining visual quality and scenic values on public lands. Visual resource management classes determine the amount of change that would be allowed to basic elements of the landscape.

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1997 "Implementation of Requirements for Noxious Weed-Free Forage on Public Lands in the Worland District, EA, DR, and FONSI," Environmental Assessment EA WY-018-EA7-131, 23 p.

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RED GULCH Dinosaur TRACKSITE

APPENDIX

APPLICABLE WASHAKIE RMP MANAGEMENT DECISIONS

Washakie RMP Management Decisions	
Cultural and Paleontological Resources Management	
Page 21	[Objective] To protect and preserve representative samples of cultural resources present in the planning area, to manage cultural resources to maintain and enhance scientific and socio-cultural values, and to ensure that the BLM's actions avoid inadvertent damage to cultural resources.
	Important paleontological sites will be protected through the use of surface and subsurface protection stipulations and discretionary management authority.
Fire Management	
Page 28	[Objective] To protect resource values, property and human life from loss due to wildfire, and to use prescribed fire to meet other resource objectives consistent with the Standards for Healthy Rangelands.... Naturally-caused wildland fires would be managed to achieve resource management objectives, keep suppression costs at a minimum and protect private property and improvements. [RMP maintenance action 9/30/97]
Lands and Realty Management	
Page 9	[Objective] To provide opportunities for the long-term use of public lands and to provide for the disposal of public lands, consistent with current laws, regulations, and policies, including those related to environmental protection, and the Wyoming Standards for Healthy Rangelands....
	Prior to any disposal action, lands will be evaluated for compliance with the disposal criteria listed in appendix B of the proposed Washakie RMP/EIS.
	...Right-of-way avoidance areas include:....—Cultural resource sites.
Minerals Management	
Page 9	[Objective] To continue to provide opportunities for the location, leasing, sale, exploration, development, and use of mineral resources consistent with current laws, regulations and polices, including those related to environmental protection and the Wyoming Standards for Healthy Rangelands....
	All public lands not formally closed to leasing are open for consideration for exploration and development of oil and gas.

<table>
<tr><th colspan="2">Washakie RMP Management Decisions</th></tr>
<tr><td colspan="2">Minerals Management (continued)</td></tr>
<tr><td>Page 9</td><td>Oil, gas and tar sands will be leased under the guidance for mitigating surface-disturbing activities in the Wyoming BLM Standard Mitigation Guidelines (see details below).</td></tr>
<tr><td></td><td>After the issuance of a lease, reasonable and necessary conditions of approval will be applied to applications for permit to drill, Sundry Notices and any other use authorizations, to protect resource uses and values, consistent with the original intent of the lease.</td></tr>
<tr><td>Page 12</td><td>In the event exploration activities result in producing oil and gas wells, specific mitigation requirements for impacts to surface resource values will be developed, based on environmental analyses of plans of operation or development.</td></tr>
<tr><td></td><td>All proposals for geophysical exploration will be evaluated on a case-by-case basis. Suitable surface protection measures based on the guidance for mitigating surface-disturbing activities in the Wyoming BLM Standard Oil and Gas lease stipulations, and access restrictions (ORV designations) will be applied. Generally, geophysical exploration will not be allowed on BLM-administered surface that is closed to oil and gas leasing.</td></tr>
<tr><td></td><td>All public lands not formally withdrawn or segregated from mineral entry will be open for exploration and development of locatable minerals. If necessary, areas of special interest or high sensitivity will be formally withdrawn from mineral entry. In other situations, the regulations listed in 43 CFR 3809 and agreements made with the State of Wyoming pursuant to those regulations will be applied to reduce unnecessary and undue degradation of resources as a result of mining.</td></tr>
<tr><td></td><td>If necessary, additional areas with special values may be proposed for withdrawal from mineral location on a case-by-case basis.</td></tr>
<tr><td></td><td>Sale and free use of salable minerals, such as sand and gravel, will occur in existing pits along the Bighorn and Nowood rivers and near Manderson and Ten Sleep. Any proposal for new material extraction sites will be subject to site specific analysis prior to approval.</td></tr>
<tr><td colspan="2">Livestock Grazing Management [Range projects]</td></tr>
<tr><td>Page19</td><td>Any new range projects proposed will be subjected to economic and environmental analyses. Adequate information to determine the economic benefits and costs and the environmental consequences will be collected before projects are approved for construction. All projects will be designed to meet allotment management objectives and to be multiple-use projects or at least to minimize any impacts to other resource values.</td></tr>
<tr><td colspan="2">Off-Road Vehicle Management</td></tr>
<tr><td>21</td><td>[Objective] To control the use of off-road vehicles as a means of reducing damage to fragile soils, wetlands, cultural values, and wildlife habitat.</td></tr>
<tr><td></td><td>Approximately 1,227,300 acres will have vehicle use limitations imposed (be designated as "limited"), to protect crucial habitat, fragile soils, wetlands, etc.</td></tr>
<tr><td></td><td>No areas will be designated as open without limitation to vehicular travel, (i.e., unrestricted use of vehicles will not be allowed).</td></tr>
</table>

<table>
<tr><th colspan="2">Washakie RMP Management Decisions</th></tr>
<tr><th colspan="2">Recreation Management</th></tr>
<tr><td>Page 21</td><td>[Objective] To enhance and expand opportunities for recreation while intensively managing areas with high recreation values.</td></tr>
<tr><td></td><td>Special recreation permits will be issued to authorize organized recreational use.</td></tr>
<tr><td>Page 22</td><td>The planning review area is located in a designated Extensive Recreational Management Area (ERMA), but is near the West Slope of the Bighorn Mountains SRMA (Special Recreation Management Area), through which most of the Red Gulch/Alkali National Back Country Byway runs.</td></tr>
<tr><th colspan="2">Visual Resource Management</th></tr>
<tr><td>Page 23</td><td>[Objective] To minimize adverse visual impacts to the land while maintaining the effectiveness of land use allocations.</td></tr>
<tr><td>Pages 23 & 24</td><td>Visual resource management objectives will be considered in the evaluation of all proposals for activities on public lands in the planning area. Impacts to visual resources will be mitigated through applying the guidance for mitigating surface-disturbing activities in the Wyoming BLM Standard Oil and Gas Lease Stipulations or mitigations developed through the environmental analyses process.</td></tr>
<tr><th colspan="2">Wildlife Habitat Management</th></tr>
<tr><td>Page 25</td><td>...chemical control of [insect] pests will be allowed... This will be subject to restrictions to protect food chains and important wildlife habitat and wetlands identified in Records of Decision on...the Rangeland Grasshopper Cooperative Management Program, findings of the Department of the Interior's Pesticide Program Review, and subsequent EISs and EAs.</td></tr>
<tr><th colspan="2">Wyoming Bureau of Land Management Mitigation Guidelines for
Surface-Disturbing and Disruptive Activities</th></tr>
<tr><td colspan="2">Areas in the immediate vicinity of significant cultural, historical, and paleontological resource sites...are avoidance areas for surface-disturbing activities.</td></tr>
<tr><td colspan="2">Surface-disturbing activities will be prohibited within 500 feet of surface water and(or) riparian areas.</td></tr>
<tr><td colspan="2">Surface-disturbing activities will not be allowed on slopes of more than 25 percent.</td></tr>
<tr><td colspan="2">To protect crucial winter range for pronghorn antelope, activities or surface use will not be allowed from November 15 to April 30 within certain areas.</td></tr>
<tr><td colspan="2">To protect important raptor and/or sage grouse nesting habitat, activities or surface use will not be allowed from February 1 to July 31 within certain areas.</td></tr>
<tr><td colspan="2">No activities or surface use will be allowed in certain identified areas for the purpose of protecting sage grouse breeding grounds.</td></tr>
<tr><td colspan="2">In any year, exception, waiver, or modification of these wildlife-related limitations may be approved in writing, including documented supporting analysis, by the Authorized Officer.</td></tr>
</table>

END

04-13-99